2.12 NOISE

The Noise Study Report, dated March 2006, is available for public review at Caltrans District 4, 111 Grand Avenue, Oakland, CA 94610, and the Solano Transportation Authority, One Harbor Center, Suite 130, Suisun City, CA 94585 during normal business hours.

Regulatory Setting

Federal Highway Administration Regulations

Under Federal Highway Administration (FHWA) regulations, noise abatement must be considered for Type 1 projects when the project results in a substantial noise increase, or when the predicted noise levels approach or exceed the Noise Abatement Criteria (NAC). Under CFR 23, Part 772, Type 1 projects are defined as construction of a highway on new location or the physical alteration of vertical or horizontal alignment of existing freeway, or additional through traffic lanes. The North Connector project is considered a Type 1 project because it involves the construction of a new roadway on a new location. Noise abatement measures, which are reasonable and feasible and are likely to be incorporated in the project, as well as increased levels for which no apparent solution is available, must be identified and incorporated into the project plans and specifications.

The Noise Abatement Criterion, established by the FHWA, classifies land uses and establishes noise thresholds for each category (see Table III.E.1). These noise criteria are assigned to both exterior and interior activities. Caltrans has further defined the level of approaching the NAC to be 1 dBA below the NAC (e.g., 66 dBA is considered approaching the NAC for Category B activity areas).

Table 2.12-1: Federal Noise Abatement Criteria

Activity Category	Noise Abatement Criteria dBA[1] Leq (h)[2]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

1. dBA - The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
2. Leq (h) - The average A-weighted noise level during the measurement period. The hourly Leq used for this report is denoted as dBA $L_{eq[h]}$.

In determining the abatement of traffic noise, primary consideration should be given to exterior noises. In situations where there are no exterior activities affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, the interior criterion shall be used as the basis of determining affects of proposed action on existing noise levels.

National Environmental Policy Act
Guidance from the FHWA in the document entitled "Highway Traffic Noise Analysis and Abatement Policy and Guidance" states that if a traffic noise impact is identified under 23CFR772, the significance of the impact under NEPA must be identified. The FHWA does not define specific thresholds for the significance of noise levels and states that the determination of significance is based on the consideration of the context and intensity of the impact as defined in the Council on Environmental Quality Regulation (40CFR1508.27). The FHWA guidance document states that the evaluation of "context" relates to the number people affected while the "intensity" relates to the absolute noise levels associated with the impact.

California Environmental Quality Act Regulations
CEQA contains general guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, a project would be considered to have a significant impact if it causes:

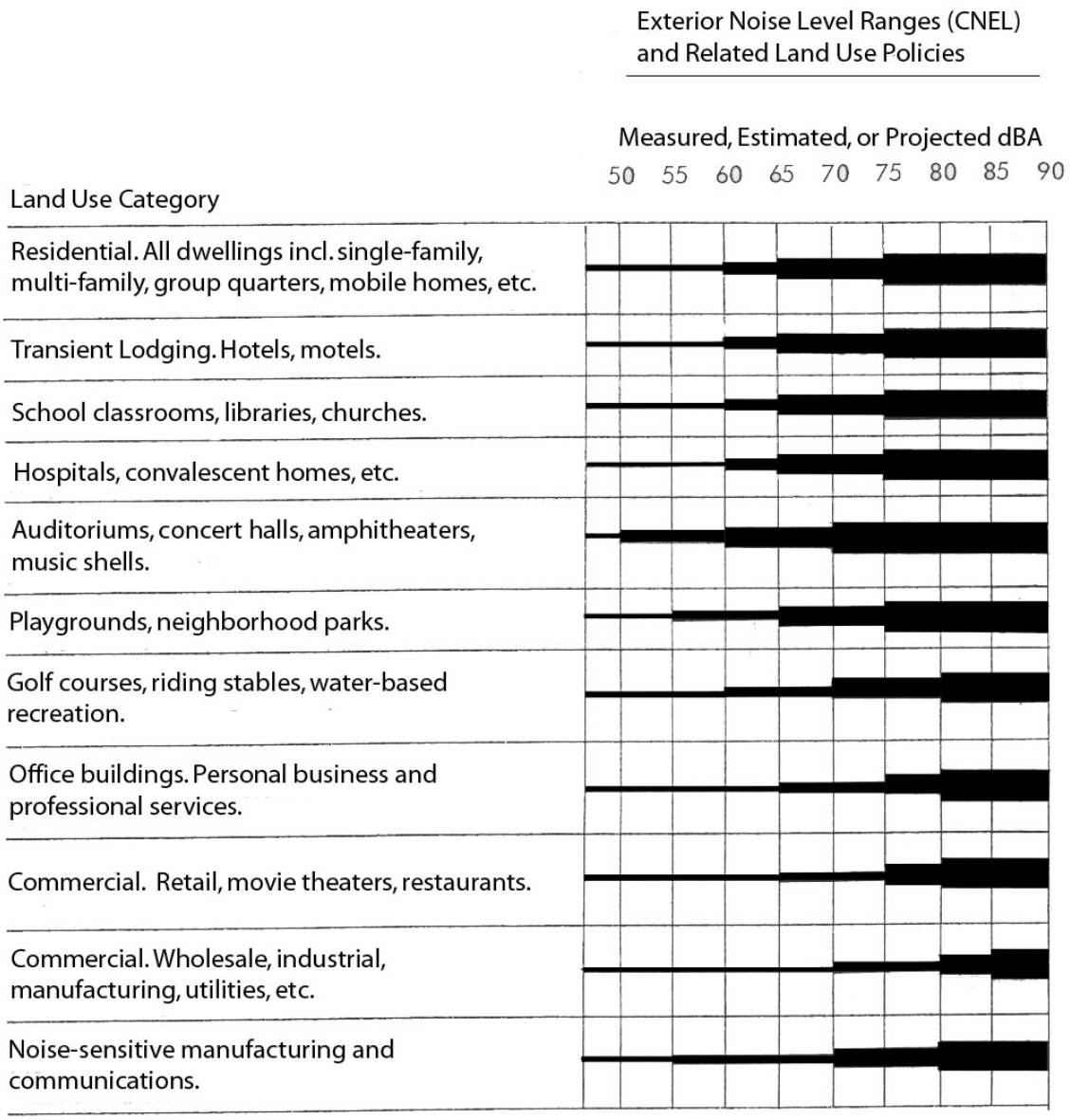
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

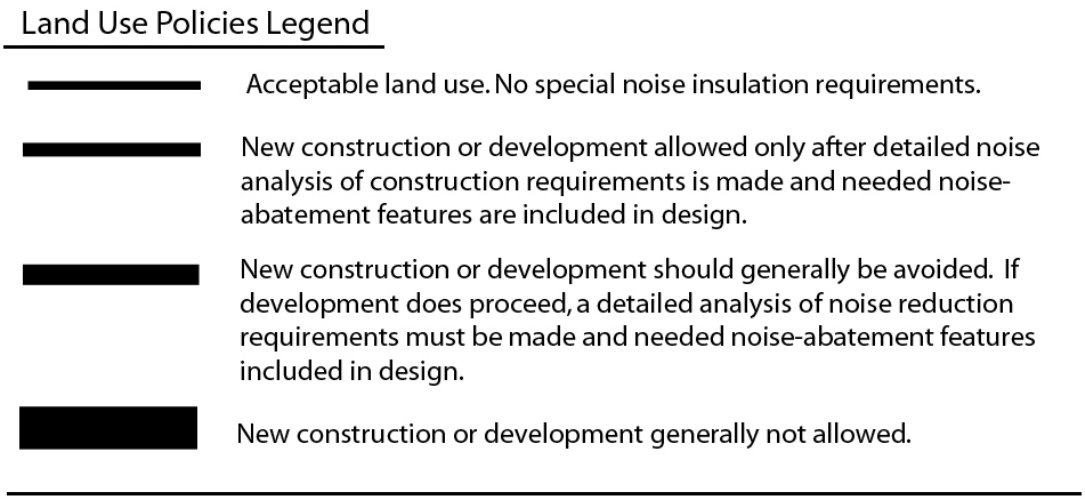
Caltrans is the implementing authority of CEQA guidelines for Type I projects for the noise measurements and monitoring. Caltrans defines that a noise increase is substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, $L_{eq(h)}$.

County of Solano General Plan Applicable Policies and Goals; HS 9.1 Ground Transportation Noise
The County of Solano set forth policies and standards to guide development and protect citizens from the harmful and annoying effects of excessive noise. The County of Solano Policies established standards for regulating noise levels in land uses. For residential area, the County of Solano established an outdoor noise threshold of 60 dBA or less. The City of Fairfield noise criteria, as listed in their general plan, is consistent with the County noise standards.

Table 2.12-2 below illustrates the County General Plan noise thresholds by land use.

Table 2.12-2 Land Use Compatibility Chart for Exterior Community Noise





Source: Criteria developed with consideration of Federal Environmental Protection Agency findings on noise levels required for uninterrupted sleep or speech, from statistics on hearing loss in the population at large due to noise, from Highway Research Board findings, and from knowledge of planning area ambient noise leves.

Affected Environment

Existing Noise Levels in the Project Area

West End

In the west end of the project area, Category B land uses include semi-rural residential receivers south of SR12 and west of Red Top Road and residential subdivisions along Venus Drive and Mural Lane. Mundy Elementary School is located just east of the residential subdivision of Mural Lane. Receivers located south of SR12 are primarily affected by noise generated by I-80 and SR12. Receivers in the vicinity of Venus Drive and Mural Lane are primarily affected by noise generated by I-80 and Business Center Drive.

Noise measurements were conducted to quantify existing worst-hour noise levels at receivers in the West End. (See Table 2.12-3) A long-term noise measurement and short-term noise measurements were conducted to represent noise levels generated by vehicular traffic at these receivers south of SR12. The location of the noise measurements are depicted in Table 2.12-3. Noise measurements were made west of Red Top Road, approximately 400 meters from Westbound I-80 (LT-1) and at the Ferrari Estate, approximately 200 meters south of SR12 (ST-1). Worst-hour noise levels at these receivers ranged from about 56 dBA to 65 dBA $L_{eq(h).}$ The highest noise levels were measured at LT-3. Noise levels at this location resulted from traffic noise generated along I-80 and SR12. Worst-hour noise levels measured at ST-1 were approximately 56 dBA $L_{eq(h)}$. At this noise measurement location, the predominant source of noise was vehicular traffic along SR12. Vehicular traffic along Red Top Road did not substantially contribute to the noise environment at these receivers.

A second long-term noise measurement (LT-2) and a short-term noise measurement were also conducted in areas representative of residential and educational land uses west of

Green Valley Road. The long-term noise measurement was made at the westernmost end of Mangels Boulevard. Worst-hour noise levels at this location were approximately 60 dBA $L_{eq(h)}$. Worst-hour noise levels at the short-term noise measurement location, approximately 245 meters from Business Center Parkway (ST-2) were 61 dBA $L_{eq(h)}$. Exterior noise levels resulted primarily from traffic along I-80, Green Valley Road, and Business Center Drive.

Central Section
Noise-sensitive residential receivers are located north of Mangels Boulevard between Green Valley Road and Suisun Valley Road. Noise measurements were conducted at two locations approximately 39 meters from the center of Mangels Boulevard (ST-3 and ST-4). Worst-hour noise levels ranged from 54 dBA to 55 dBA Leq(h). Noise levels were primarily the result of vehicular traffic along Mangels Boulevard and distant I-80 traffic.

East End
Category B receivers in the east segment of the North Connector are generally rural-type residential receivers located along the westbound side of Interstate 80. Noise measurements were conducted over a period of 24-hours or more at two locations (LT-3 and LT-4) and at three locations for a period of ten minutes each. Long-term noise measurements were made at the southernmost end of Kaiser Road, approximately 159 meters from I-80, and along Russell Road, approximately 400 meters from I-80. Short-term noise measurements were conducted near Solano Community College (ST-5) and at residential receivers along Russell Road (ST-6 and ST-7). The noise environment at receivers in the vicinity of the east segment of the North Connector is dominated by traffic noise from Interstate 80. Depending on the distance of the noise measurement location to Interstate 80, measured peak hour noise levels ranged from about 64 dBA to 70 dBA Leq(h).

Table 2.12-3 Existing Worst-Hour Noise Levels by Project Section

Receiver	Description	Type of Development	Noise Abatement Category and Criterion (dBA)	Date	Time	Leq (10 min) (dBA)	Worst Leq (hr) (dBA)	Ldn (dBA)	Exceeds NAC?
LT-1	Northwest of Red Top Road, approximately 400 meters from westbound I-80.	Residential	B(67)	11/18/03 to 11/19/03	12:00 to 16:00	-	65	67	No
LT-2	West end of Mangels Boulevard.	Residential	B(67)	11/17/03 to 11/19/03	17:00 to 14:00	-	60	61	No
LT-3	South end of Kaiser Drive ~159 meters from I-80.	Residential	B(67)	11/17/03 to 11/19/03	17:00 to 16:00	-	70	72	Yes
LT-4	Russell Road. ~400 meters from westbound I-80	Residential	B(67)	11/18/03 to 11/19/03	13:00 to 16:00	-	64	66	No
ST-1	Ferrari Estate. ~200 m from SR12	Residential	B(67)	11/19/2003	12:50	52	56	58	No
ST-2	Field south of Mundy Elementary School. ~245 meters to Business Center Parkway. Representative of adjacent residential land uses.	Residential	B(67)	11/18/03	15:03	59	61	62	No
ST-3	Mangels Boulevard, ~38 meters to centerline (between Business Center and Green Valley Road). Representative of	Residential	B(67)	11/19/03	13:40	54	54	55	No

	adjacent residential land uses.								
ST-4	Mangels Boulevard. ~39 meters from centerline. Representative of adjacent residential land uses.	Residential	B(67)	11/19/03	14:02	55	55	56	No
ST-5	Solano Community College Southernmost Boundary ~ 289 meters to right lane of westound I-80. Reference location.	-	-	11/19/03	15:39	62	65	67	No
ST-6	Russell Road. ~100 meters from westbound I-80.	Residential	B(67)	11/18/03	13:40	67	68	70	Yes
ST-7	Russsell Road ~400 meters from westbound I-80.	Residential	B(67)	11/18/03	14:10	63	64	66	No

Impacts

Methodology

The compatibility of proposed projects with existing and future noise levels due to ground transportation noise sources was evaluated by comparison to where the existing or future noise level from ground transportation noise sources is determined to exceed the standards of Table 2.12-1. When increases in traffic noise levels were predicted, noise abatement measures are evaluated and considered. However, the noise abatement measures must be *feasible and reasonable.*[1]

A substantial noise increase would occur if the project causes a 12 dBA or greater increase in noise level at a noise-sensitive receiver. For these areas, noise mitigation would need to be evaluated. For areas where the NAC is approached (e.g. 66dBA for outside residential use areas), noise abatement must be considered, and when reasonable and feasible, provided as part of the project. For noise barriers to be considered feasible a 5-dBA reduction must be achieved and the line of sight between a truck stack, assumed to be 3.5 meters (11.5 feet) high, and the receiver, assumed to be 1.5 meters (5 feet) above the surrounding ground, should be interrupted. The noise barrier must also conform to Caltrans design standards (Caltrans Highway Design Manual, Chapter 1100 5th Edition). Under these guidelines, the height of noise barriers is limited to 4.8 meters (16 feet), unless constructed within 4.5 meters (15 feet) of the traveled way where the limit is 4.2 meters (14 feet).

Category B (residential) land uses within the project area were identified through a review of mapping, aerial photographs, and site visits to the study area. These sites and the existing worst-hour noise levels are listed in Table 2.12-3. In the West End of the study area, Category B land uses include rural-character residences west of SR12 and a more modern residential subdivision west of Green Valley Road. Residences depicting rural character are also located in the Central Section and East End of the study area.

Noise Levels with Project

Table 2.12-4 shows the results of noise modeling for future conditions. Future conditions include 2030 traffic projections. Where noise levels approach or exceed the NAC, noise barriers were analyzed. The results are presented separately for each study segment. A future noise level of 66 dBA Leq(h) is considered to approach the NAC for Category B receivers (e.g., residences).

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[1]Feasibility is an engineering consideration, where feasible noise barriers must achieve a minimum of 5 dBA noise reduction and interrupt the line of sight between a truck stack (assumed to be 11.5 feet high) and the impacted receiver (assumed to be 5 feet above ground). The feasibility criterion is not necessarily a noise abatement design goal. Greater noise reductions are encouraged if they can be reasonably achieved.

The determination of reasonableness in noise abatement is more subjective than the determination of its feasibility. It implies that common sense and good judgment have been applied in arriving at a decision to include noise abatement features in the project.

West End
The West End extends from Red Top Road just west of SR-12 to the western terminus of Business Center Drive. Three residences are located on the west side of Red Top Road and south side of Route 12. Ambient noise measurements were made at Locations LT-1 and ST-1 to characterize noise levels here. Currently, vehicular traffic on Interstate 80 and State Route 12 are the most significant steady sources of traffic noise. In the future, traffic volumes are projected to substantially increase along Red Top Road, decrease along SR-12, and noise levels generated by Interstate 80 are expected to increase by 2 dBA. Because the receivers are set back more than 400 feet from Red Top Road, noise from the project is modeled to be to be approximately 56 dBA $L_{eq(h)}$. Noise levels generated by Interstate 80 and SR-12 would be approximately 67 dBA $L_{eq(h).}$ Future noise levels would exceed the NAC at these receivers.

Receivers are located along Venus Drive north of the existing western terminus of Business Center Drive. Existing noise levels result from vehicular traffic on Interstate 80. Noise generated exclusively by project traffic is predicted to yield a worst-hour L_{eq} noise level of 54 dBA to 58 dBA along Venus Drive. The noise from the new project combined with future noise from I-80 would cause noise levels to increase by 3-4 dBA $L_{eq(h)}$. Noise from the North Connector Project and I-80 would be below the Noise Abatement Criterion. There would be no noise impacts upon sensitive receivers in the vicinity of Venus Drive.

Central Section
Existing land uses in the vicinity of the Central Section of the North Connector Project consist of commercial land uses and vacant property zoned for commercial development. The North Connector Project would involve reconstructing the intersection of Business Center Drive and Mangels Boulevard. The intersection would be realigned so the main flow of traffic will be along Business Center Drive. There would be no noise impacts in the Central Segment.

East End
The east end extends from Suisun Creek to Abernathy Road. East of Suisun Creek the North Connector Project would be constructed as a four-lane, at-grade roadway. Residential land uses and commercial uses would be displaced with the project. The project would locate the roadway south of remaining residential uses (Orcivoli and the Gonzales residence). Future noise levels would reach 70 dBA Leq(h) at the Orcivoli residence and up to 66 dBA Leq(h) at the Gonzales property. Receivers on these properties qualify for consideration of noise abatement.

Table 2.12-4 Future Worst Hour Noise Levels by Project Section

Receiver	Location	North Connector 2030 AM Leq(h)	North Connector 2030 PM Leq(h)	Cumulative I-80 Leq(h)	Cumulative Noise Level Leq(h)	Existing Noise Level Leq(h)	Cumulative vs. Existing Leq(h)	Impact Type
West End								
W9	Venus Drive	56	55	62	63	60	3	NONE
W10	Venus Drive	56	54	62	63	60	3	NONE
W11	Venus Drive	58	57	62	63	60	3	NONE
W12	Venus Drive	58	57	62	64	60	4	NONE
W13	Venus Drive	57	56	62	63	60	3	NONE
LT-1	Ferrari APN 0180-010-100	56	55	67	67	65	2	A/E
East End								
E9	Orcivoli APN 0027-251-370	63	62	70	70	68	2	A/E
E10	Gonzales APN 0027-510-080	55	54	66	66	64	2	A/E

Avoidance, Minimization, and Mitigation Measures

Temporary Impacts – West, Central, East

Construction Noise

The North Connector involves construction of a new road with grading, paving and ancillary facilities such as traffic signals, lighting, signs, landscaping and fencing. Two pre-cast concrete girder bridges would be built across the Dan Wilson Creek and Suisun Creek. The bridges would have abutments on pile supported foundations, and can span the creeks without center piers. No construction activities are planned within the creeks.

Construction activities would differ by Section. The West End would require grading for the proposed connection to SR 12. Red Top Road intersection would have to be improved under traffic. The western part of the center section requires minor grading, but the Contractor would be required to maintain local access at intersections and driveways. Some major grading would be required at the eastern part of the central section. Most of the east section is on level agricultural land with the road just above the existing ground. There would be limited grading and minor access requirements for the intersecting farm roads. The North Connector merges with Abernathy Road on the east end, which would require staging and traffic control for construction.

Order of Work for Construction of Road And Bridges

The general order of work for a typical road section is as follows:

- Relocate underground and above ground utilities (gas lines, electrical lines, water lines & sanitary sewerage) within construction area.
- If required for staging, install temporary streetlights and signals, temporary paving and safety barriers.
- Clear and grub area to be graded. Remove existing pavements, structures and utilities within construction zone.
- Trench excavate, shore and install underground utilities including culverts, storm drainage and conduits. Backfill as required.
- Grade roadway to final subgrade and place curb and sidewalk, curb ramps and driveways. Place subbase and base courses.
- Place AC pavement and striping.
- Install new traffic signals and street lighting. Place new signs and remove temporary pavements and signs.
- Complete landscaping and fencing. Clean up site and remove equipment and remaining materials.

The general order of work for a bridge is as follows:

- Excavate and shore for abutment foundations.
- Drive piles for abutment foundations.
- Form and pour concrete abutments.
- Install pre-cast concrete girders.
- Form and pour concrete deck with barriers.

- Install conduits, signs and fencing.
- Restore site around abutments. Clean up and remove equipment and remaining materials.

Construction Staging
Construction staging would be required at the Red Top Road Intersection, in the developed areas of the central section and at Abernathy Road on the east end. The work would be divided into stages to maintain existing traffic flow and local access. For each stage, the contractor is typically required to provide a minimum number of through lanes and possibly one turning lane to satisfactorily accommodate vehicular traffic during construction. The contractor is also typically required to maintain local vehicular access to driveways and properties, even when an existing street is closed for construction. The contractor may be allowed to close major streets and intersections at night and during a weekend.

Construction Schedule
The construction for each section is estimated to take approximately six to nine months. The construction time would vary depending upon the final staging plan for the work. Construction is anticipated to take eighteen to twenty four months and is anticipated to begin in approximately 2010.

Construction Noise
Construction is anticipated to occur over a six to nine month period in each section. Roadway construction activities do not typically stay in one location for long periods. Noise sensitive receivers in a given location should not be exposed to noise generated by construction for extended periods.

Activity from construction would increase noise levels at locations immediately adjacent to the project. Noise generated by construction equipment drops off at a rate of 6 dBA per doubling of distance.

The construction noise would be temporary, and these noise impacts would be considered less than significant assuming the followed construction noise controls are implemented during construction.

- Noise-generating activities at the construction site or in areas adjacent to the construction site associated with the project should be restricted to daytime hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturdays. Construction activities should be avoided on Sundays or holidays.
- Equip all internal combustion engine driven equipment with intake and exhaust mufflers which are in good condition and appropriate for the equipment.
- Unnecessary idling of internal combustion engines within 100 feet of residences should be strictly prohibited.
- Avoid staging of construction equipment within 200 feet of residences and locate all stationary noise-generating construction equipment, such as air compressors and portable power generators, as far practical from noise sensitive residences.

Preliminary Noise Abatement Analysis

Where noise levels were predicted to approach or exceed the NAC, receivers were considered noise impacted. Under Caltrans and FHWA policies, feasible noise barriers must provide a minimum 5 dBA reduction in traffic noise. Furthermore, under Caltrans policies, noise barriers should interrupt the line of sight between a truck stack (of average height) and a receiver. Chapter 1100 of the Highway Design Manual identifies particular design guidelines that should be met for noise barriers, depending on roadway conditions. Under these guidelines, the height of noise barriers should be limited to 4.8 meters (16 feet), unless constructed within 4.5 meters (15 feet) of the traveled way where the limit should be 4.2 meters (14 feet). Many of the locations for barriers along the project would be located within 4.5 meters (15 feet) of the travel way.

The feasibility of noise barriers was studied where receivers would be noise impacted. Noise barriers were analyzed at the right-of-way and on private property. Noise barriers at the right-of-way (minimum of 250 meters in length and between 1.8 and 4.9 meters high) were not found to be feasible, as they would not achieve a minimum of 5 decibels of noise reduction. Noise barriers modeled at the North Connector right-of-way would achieve approximately 1-4 dBA of noise reduction. Feasible private property noise barriers could be constructed to shield small portions of residential outdoor use areas near the residential units. The exact placement of these barriers would need to be confirmed with the cooperation of the receivers in the design of the acoustically shielded areas. Feasible sound walls that may be reasonable are summarized on Table 2.12-5. Table 2.12-5 also identifies the noise level reduction that sound walls could achieve.

West End

SW1: Private property barriers could be constructed in a manner to reduce noise levels by 5 dBA at portions of the three affected residences on the Ferrari property (APN 0180-010-100). It is assumed that the barriers would protect a 2,500 sq. ft. area (50 feet wide and 50 feet long). The total length of each three-sided barrier would be 150 feet. These sound walls would benefit one receiver each. The minimum height of a feasible sound wall would be 3.6 meters (12 feet). A 3.6 meter noise barrier would provide about 6 dBA of noise reduction and a 4.2 meter barrier would provide about 8 dBA of noise reduction.

There are no other noise-impacted receivers identified in this segment.

Central Section

There are no noise-impacted receivers identified within this segment.

East End

SW2: A private property sound wall at the Orcivoli Residence (APN 0027-251-370) could be feasible and would benefit one receiver. It is assumed that the barrier would protect a 2,500 sq. ft. area (50 feet wide and 50 feet long). The total length of the three-sided barrier would be 150 feet. The minimum height of a feasible sound wall would be 3.0 meters (10 feet). Traffic noise would be reduced by about 6 dBA over unattenuated conditions. A 3.6 meter noise barrier would provide about 8 dBA of noise reduction and a 4.2 meter barrier would provide about 10 dBA of noise reduction.

SW3: A private property sound wall at the Gonzales Residence (APN 0027-510-080) could be feasible. This barrier would benefit one receiver. It is assumed that the barrier would protect a 2,500 sq. ft. area (50 feet wide and 50 feet long). The total length of the

three-sided barrier would be 150 feet. The minimum height of a feasible sound wall would be 3.6 meters (12 feet). A 3.6 meter noise barrier would provide about 6 dBA of noise reduction and a 4.2 meter barrier would provide about 8 dBA of noise reduction.

There were no other noise-impacted areas identified in this segment.

Noise Abatement Feasibility and Reasonable Cost Allowances

Table 2.12-5 provides a summary of sound walls that are found to be feasible and may be reasonable. Reasonableness allowances were calculated for these feasible sound walls.

Preliminary reasonableness (i.e. cost effectiveness) of each noise abatement measure will be determined by individually comparing each reasonable allowance to the estimated construction cost. The final reasonableness, in addition to cost effectiveness, should take into consideration the views of the impacted receivers, environmental impacts of the abatement construction, input from public and local agencies, and any other pertinent social, economic, legal or technological factors. In particular, the views of the impacted receivers will be a major consideration in the determination of final reasonableness. The final abatement decision will be made after the public input process and is reflected in the Final Environmental Document. If the reported abatement design changes after approval of the Final Environmental Document, a project re-analysis may be necessary.

The reasonableness allowance considers the absolute future noise level, the noise level increase caused by the project, the achievable reduction provided by the sound wall, and the age of the dwelling unit (built before or after 1978). The reasonableness allowance per design receiver was calculated based on the factors shown in Appendix A of the Traffic Study along with the detailed reasonableness allowance calculations for each sound wall. The current base reasonable allowance of $32,000 was used. Caltrans policies include a modification of the reasonable allowance to account for the total project costs. Because the total reasonable costs listed in Table 2.12-5 are less than 50% of the estimated project construction cost, no modification of the allowance is necessary.

SW1: Sound walls could be constructed on private property to protect areas of frequent human use. Each sound wall would provide a feasible noise reduction at 1 Category B receiver. A 3.6 meter (12-foot) high sound wall would provide a 6 decibel reduction in traffic noise. The reasonableness allowance per benefited receiver is calculated at $46,000 for the 3.6 meter barrier. Since one receiver would benefit from this barrier, the total reasonable cost for SW1 would be $46,000. 4.2 meter (14-foot) and 4.8 meter (16-foot) barriers would provide a noise reduction of approximately 7 to 9 dBA. The total reasonableness allowance would be slightly higher for 4.8 meter barrier because of increased noise attenuation provided by the larger barrier.

SW2: A sound wall could be constructed on private property to protect areas of frequent human use. This sound wall would provide a feasible noise reduction at 1 Category B receiver (Orcivoli Residence). A 3.0 meter (10-foot) high sound wall would provide approximately 6 decibels of noise reduction. The reasonableness allowance per benefited receiver is calculated at $48,000 for the 3.0 meter and 3.6 meter barriers. Since one receiver would benefit from this barrier, the total reasonable cost for SW2

would be $48,000. 4.2 meter (14-foot) and 4.8 meter (16-foot) barriers would provide a noise reduction of approximately 9 to 11 dBA. The total reasonableness allowance would be $50,000 for a 4.2 meter or 4.8 meter barrier because of increased noise attenuation provided by the larger barrier.

SW3: A sound wall could be constructed on private property to protect areas of frequent human use. This sound wall would provide a feasible noise reduction at 1 Category B receiver (Gonzales Residence). A 3.6 meter (12-foot) high sound wall would provide a 6 decibel reduction in traffic noise. The reasonableness allowance per benefited receiver is calculated at $46,000 for the 3.6 meter barrier. Since one receiver would benefit from this barrier, the total reasonable cost for SW1 would be $46,000. 4.2 meter (14-foot) and 4.8 meter (16-foot) barriers would provide a noise reduction of approximately 7 to 9 dBA. The total reasonableness allowance would be slightly higher for 4.8 meter barrier because of increased noise attenuation provided by the larger barrier.

Severe traffic noise impacts are considered when after-project noise levels are 75 dBA, $L_{eq[h]}$ or greater. No severe noise impacts were identified for this project.

Table 2.12-5 - Summary of Sound Walls

Sound Wall	Alternative	Description	Length	Predicted Noise Reduction	Number of Benefited Receivers or Residences	Reasonable allowance per residence ($000s)	Total Reasonable Allowance ($000s)
SW1	3.6m	Ferrari Residence APN 0180-010-100	~45m	6 dBA	1	$46	$46
	4.2m			8dBA	1	$46	$46
	4.8m			9dBA	1	$48	$48
SW2	3.0m	Orcivoli Residence APN 0027-251-370	~45m	6dBA	1	$48	$48
	4.6m			8dBA	1	$48	$48
	4.2m			10dBA	1	$50	$50
	4.8m			11dBA	1	$50	$50
SW3	3.6m	Gonzales Residence APN 0027-510-080	~45m	6dBA	1	$46	$46
	4.2m			8dBA	1	$46	$46
	4.8m			9dBA	1	$48	$48

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